without regard to the movements of the larger organization. They might all meet together at times and places where the accommodations were adequate, but such places would be few and far between.

Of course, this would result, under the present conditions, in a society and a section with similar aims meeting in different places at the same time and a member of both might have difficulty in deciding which of the two he should attend. But the remedy is a simple one. These separate societies have, by right of preemption, a claim upon the Christmas holidays for their meetings. The whole trouble has been caused by the American Association for the Advancement of Science, which has encroached upon this period and is now trying to force the independent organizations to accommodate themselves to its actions. All that is necessary for full harmony is that the association return to its summer meetings, leaving the Christmas vacation free to its rightful possessors.

J. S. KINGSLEY.
TUFTS COLLEGE,
January 13, 1904.

THE SCINTILLATIONS OF RADIUM.

THE phenomenon of the scintillation of a phosphorescent screen, under the influence of the radium bombardment, which was first described by Sir William Crookes, is one of the most impressive spectacles which we have had for a long time.

As comparatively few of us have had an opportunity of witnessing this remarkable sight, I have prepared about two dozen 'spinthariscopes,' which I shall be very glad to pass around among my colleagues, on the condition that they be promptly returned.

Last autumn, while experimenting with some phosphorescent materials, I found that the scintillations could be as easily seen when the radium was mixed with the phosphorescent powder (the mixture being pressed between two plates of glass) as in the usual form of Crookes's spinthariscope.

If one sits for several minutes in an *absolutely dark* room, and then examines the plate with a powerful pocket magnifying glass, the appearance reminds one of an enormous star cluster as seen in a telescope, the individual stars lighting up and disappearing in rapid succession, producing an impression which has been likened to that produced by moonlight on rippling water.

Whether the flashes are produced by the impact of the individual electrons which constitute the α rays, as was imagined by Crookes, or whether they represent microscopic cleavages which are occurring in the crystals as a result of the bombardment, as Becquerel believes, is still an open question. The fact that hundreds of flashes appear every few seconds, the action showing no signs of abatement after several months, makes it difficult to believe that each flash represents a split in a crystal, unless one is prepared to accept the doctrine of 'infinite divisibility.' It is, perhaps, equally hard to believe that the impact of a single electron is responsible for each flash. The obvious way of settling this question would be to make a rough estimate of the number of flashes produced in a given time by a very small amount of radium of very low activity, and see if the number was of the same order of magnitude as the number of positive electrons given off in the same time. If the number of emitted electrons far exceeds the number of flashes, we may find a way out of the difficulty by assuming that the electrons are thrown out in intermittent streams, the impact of each 'squirt' producing a flash.

On carefully scrutinizing the screen it is almost impossible to avoid forming the opinion that the points of light are in motion, the whole field squirming with light, like a colony of infusoria under the microscope. This appearance is, perhaps, a little more pronounced with the Crookes spinthariscope, in which a speck of highly active radium is mounted at a little distance above the screen. If this motion should turn out to be real and not illusory it could, perhaps, be explained by a slight sweeping motion of the streams of electrons emitted by the radium. Such speculations are scarcely worth while, however, in view of the very deceptive nature of illusions of motion. The plates which I have prepared for distribution are packed in small tin boxes, which can be sealed up in an ordinary envelope. Institutions desiring to borrow one will be

accommodated as promptly as possible. The limited number of plates available will of course cause more or less delay in complying with many requests. A prompt return of each plate is to the interest of all. A self-addressed envelope with four cents in postage affixed should accompany each application.

Failure to observe the phenomenon can only result from an insufficient resting of the eyes. Half an hour in subdued light such as lamplight, followed by four or five minutes in *absolute* darkness is the *sine qua non* of success.

The magnifying glass employed should have a power of five or six diameters. A Coddington lens, or Hastings triplet is suitable.

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SPECIAL ARTICLES.

THE OCCURRENCE OF ZINC IN CERTAIN INVERTEBRATES.

In the course of an investigation on the chemical physiology of certain invertebrates, undertaken under the direction of Dr. Lafayette B. Mendel, it was found that the ash of the hepato-pancreas of the large carnivorous gastropod, *Sycotypus canaliculatus,* contained an element hitherto unobserved in such connection, namely zinc. So far as the writer is aware, this element has never been observed as a normal constituent of the tissues of any animal, vertebrate or invertebrate. The reaction by which zinc was first suspected was the ordinary ferrocyanide test for ferric iron in acid solutions. Not only was iron present, as indicated by the blue color, but some other metallic element as well, giving a marked slimy precipitate. Further investigation showed the presence of a heavy metal having all the characteristic chemical properties of zinc.

Quantitative separations were made difficult by the presence of very large amounts of phosphoric acid, and the basic-acetate method was resorted to. The well-known limitations of the latter make it, however, scarcely more than of qualitative value. By this method samples of ash from *Sycotypus canaliculatus* gave approximately eleven per cent. and twelve per cent. respectively of ZnO.

Further separations have since been made by means of Hampe's well-known method (slightly modified),* depending upon the precipitation of ZnS from a formic acid solution of sufficient strength to prevent the precipitation of the iron. By this method concordant results have been obtained as shown in the table below. At the same time qualitative examinations were made of specimens dredged from various parts of Long Island Sound about New Haven, and in all cases zinc was found in large quantities in the ash of *Sycotypus* and *Fulgur carica.*

Copper was estimated electrolytically in each case; in one sample by the rotating cathode method of Gooch and Medway. Iron was determined by permanganate titration in the usual way. Blanks were run through to detect the possible presence of zinc in the reagents, and great care was exercised throughout to prevent any contamination.

Other tissues besides the hepato-pancreas were incinerated and examined, and other gastropods and crustacea dredged from the same localities were also tested. With the exception of the blood of *Sycotypus,* no further occurrence of zinc has yet been detected.

The following table of ash analyses summarizes the result of the investigation as far as it has been carried.

	Samples Obtained.	Fe.	Cu.	ZnO.
Sycotypus (hepato-pancreas.	May, 1903	Present	Present	Present
Sycotypus.	May, 1903	"	8.57%	11.97%
Sycotypus.	May, 1903	"	8.17%	10.81%
Sycotypus.	Sept., 1903	"	8.47%	19.00%
Sycotypus.	Sept., 1903	"	7.83%	23.38%
Sycotypus.	Nov., 1903	0.84%	.....	18.80%
Sycotypus.	Nov., 1903	0.84%	.....	18.60%
Blood of *Sycotypus.*	Nov., 1903	Present	Present	Present
Fulgur.	May, 1903	"	"	"
Fulgur.	Sept., 1903	"	"	"
Fulgur.	Nov., 1903	"	"	"

The following other marine forms have been examined for zinc, with negative or doubtful results in all cases: *Urosalpinx cinerea, Mytilus edulis, Modiola plicatula, Argina*

* W. Hampe, *Chemiker Zeitung,* IX., 543 (estimation of zinc).